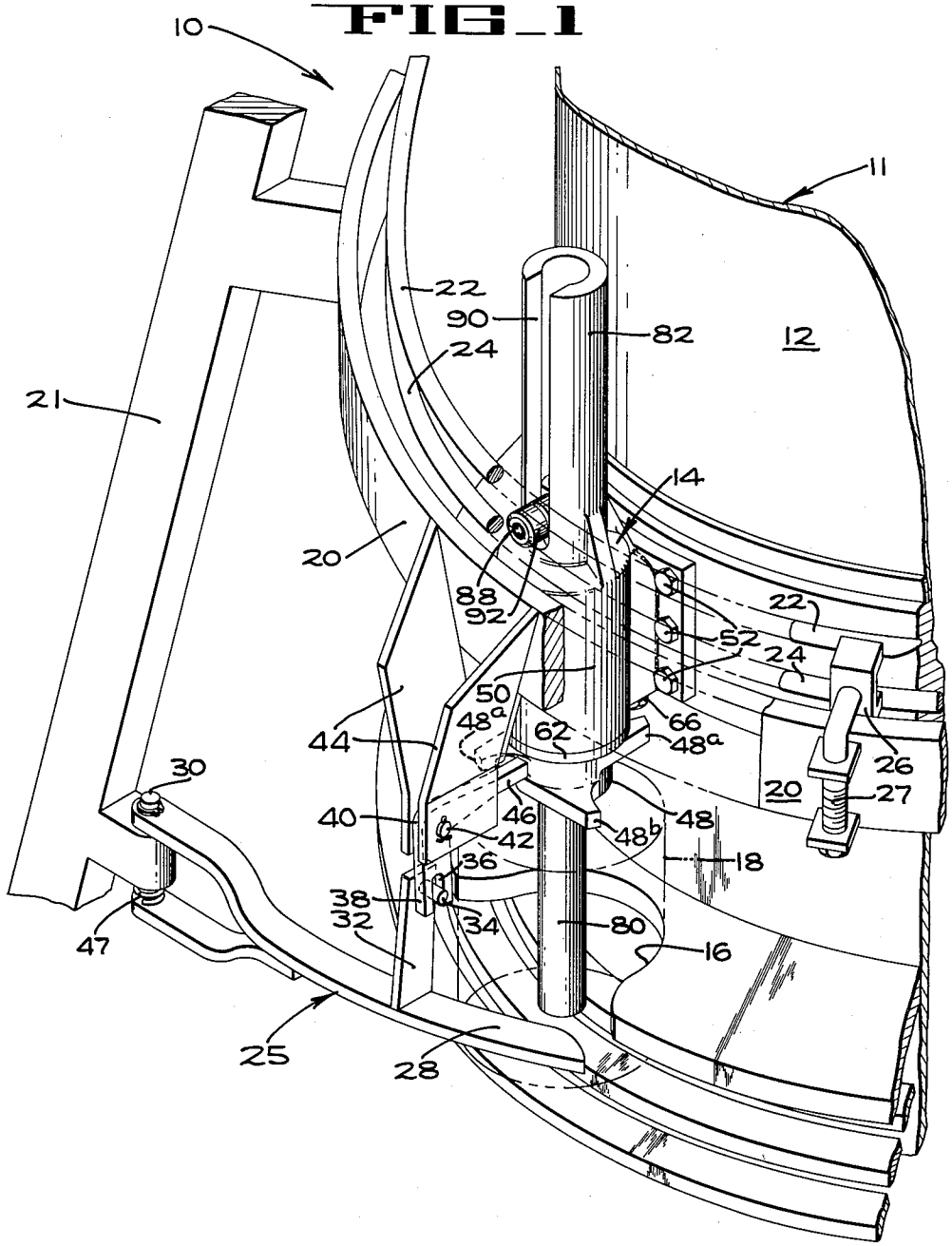
June 26, 1962 R. D. KNOLL 3,040,787

BOTTOM FILLING NOZZLE

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FIG_1



INVENTOR
RUSSELL D. KNOLL

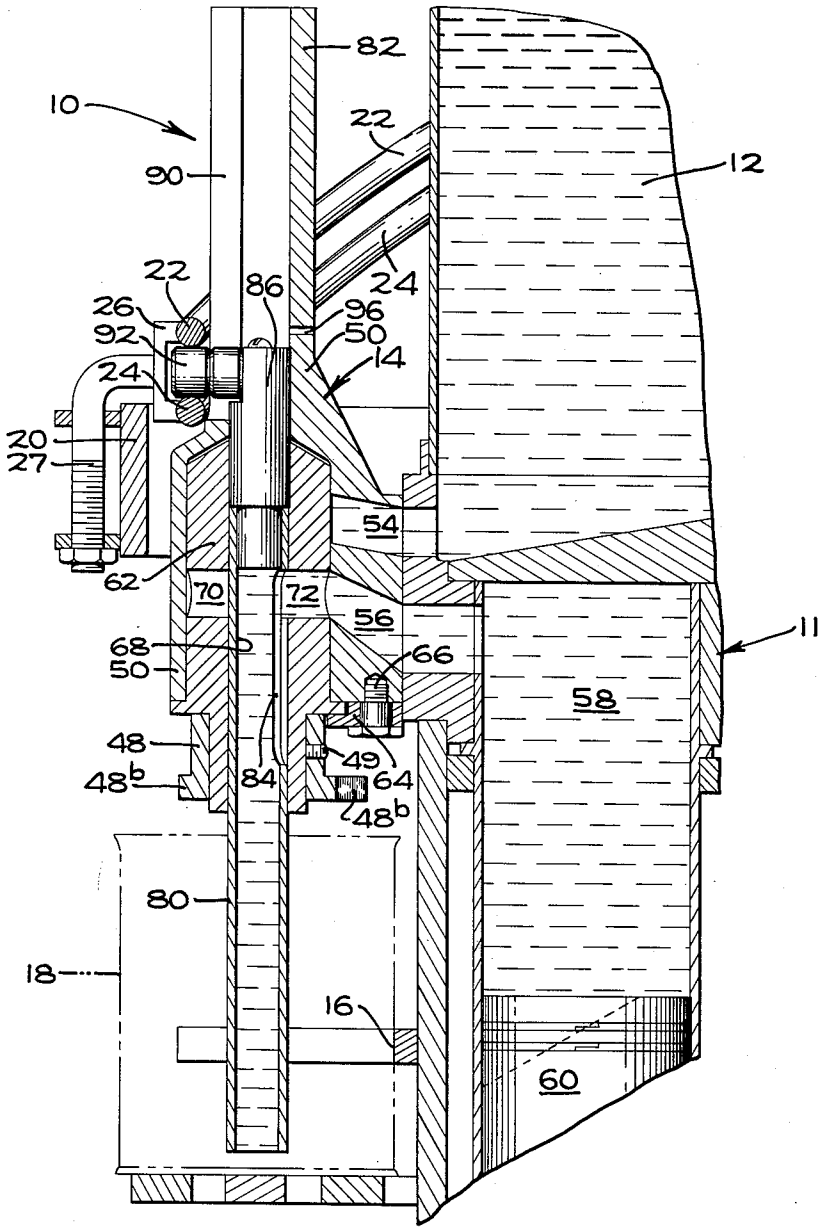
BY Hans G. Hoffmeister
ATTORNEY

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BOTTOM FILLING NOZZLE

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FIG. 2



INVENTOR
RUSSELL D. KNOLL

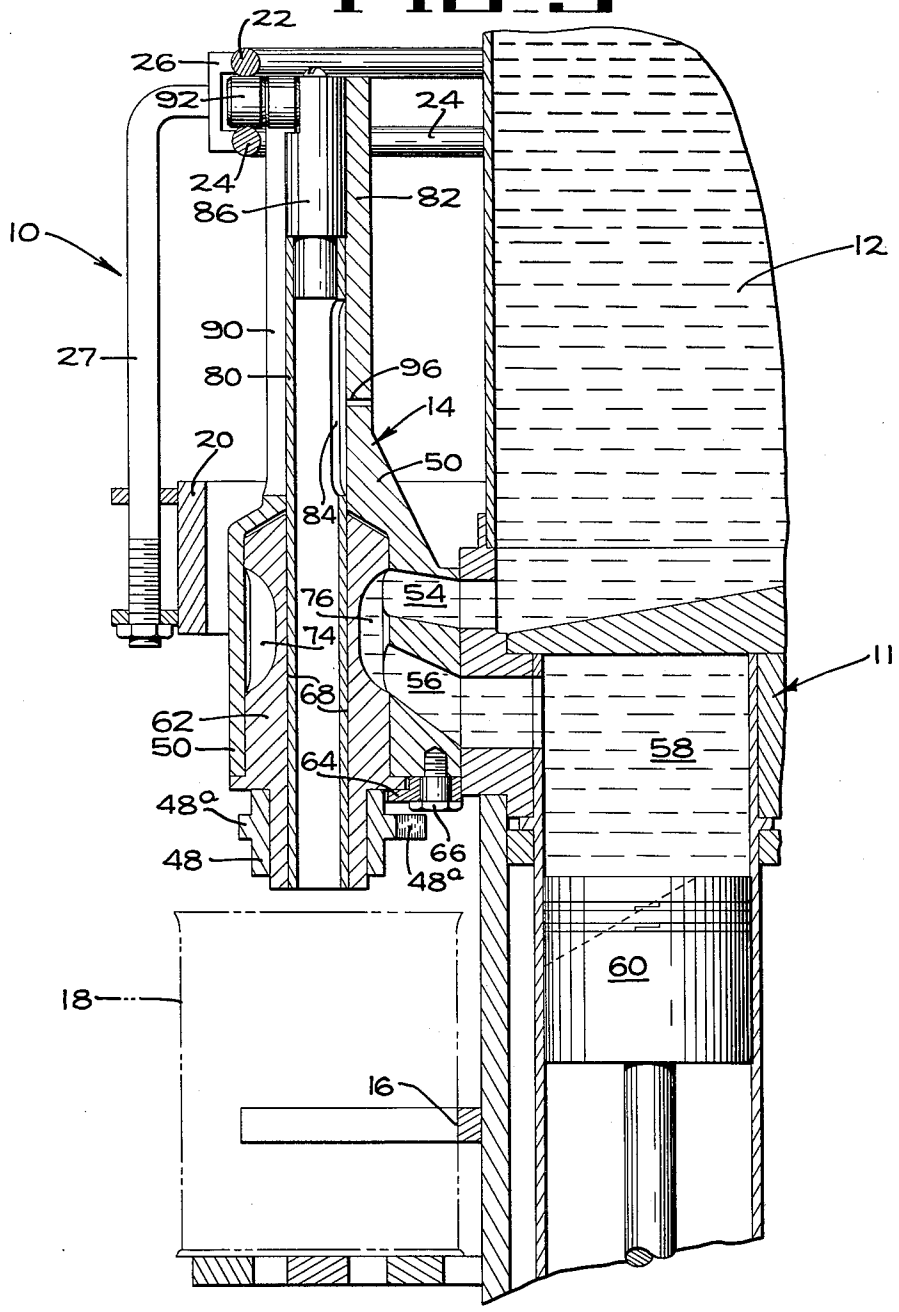
BY Hans G. Hoffmeister.
ATTORNEY

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BOTTOM FILLING NOZZLE

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FIG. 3



INVENTOR
RUSSELL D. KNOLL

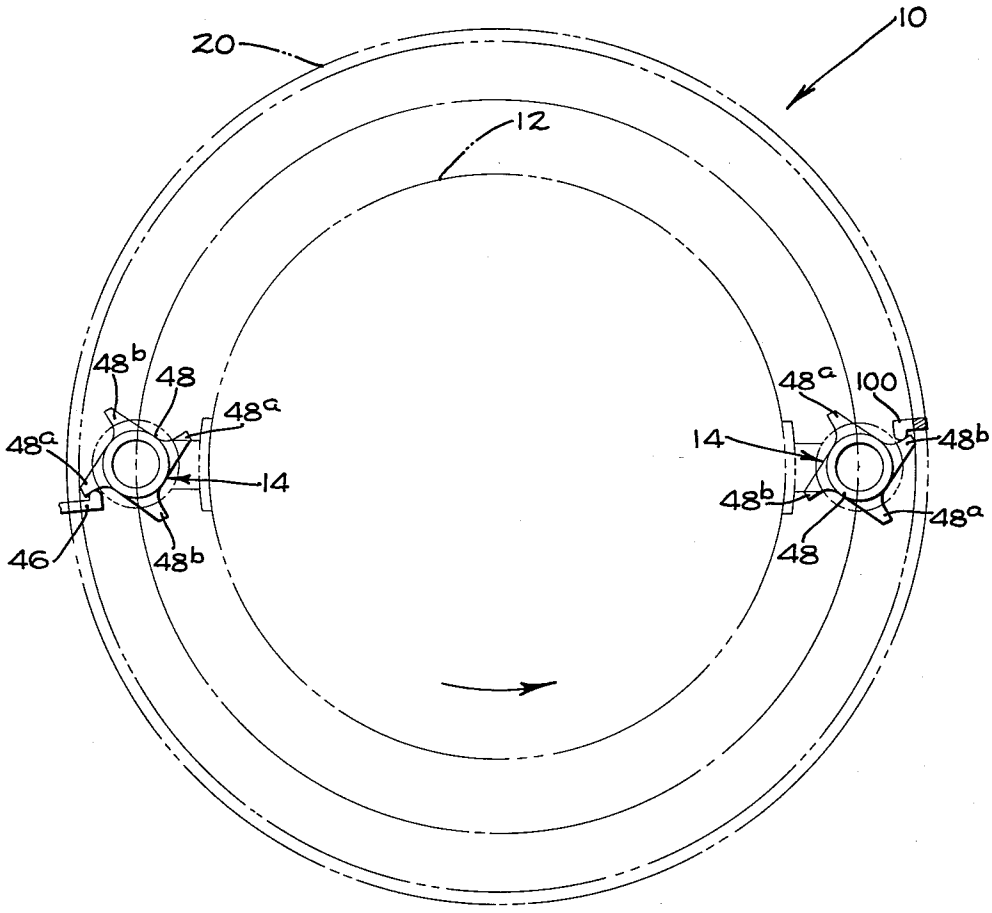
BY Hans G. Hoffmeister
ATTORNEY

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BOTTOM FILLING NOZZLE

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FIG_4



INVENTOR
RUSSELL D. KNOLL

BY Hans G. Hoffmeister
ATTORNEY

United States Patent Office 3,040,787 Patented June 26, 1962

3,040,787

BOTTOM FILLING NOZZLE

Russell D. Knoll, Hoopeston, Ill., assignor to FMC Corporation, a corporation of Delaware

Filed Apr. 30, 1959, Ser. No. 810,083
9 Claims. (Cl. 141—143)

This invention pertains to container filling apparatus, and more particularly to an improved movable filling nozzle for a filling machine.

The filling nozzle of the present invention finds particular utility in filling containers with foaming type liquids, or with sticky or clinging products. When containers are filled with foaming type liquids, air is usually entrained due to the vortex action of the filling stream entering the liquid already in the container. By use of the device of the present invention, the filling stream from the nozzle enters the product already in the container at a point below the surface of the product thus eliminating the vortex action, and the foaming of the product resulting therefrom. When filling sticky or clinging products, such as mayonnaise or marshmallow, by filling apparatus of the type formerly used, the product tended to pile up and leave voids around the edges of the container. By using the nozzle of the present invention the filling stream from the nozzle enters the product at a point below the surface thereof so that the product is forced laterally against the sides of the container to completely fill the container and eliminate such voids.

It is an object, therefore, of the present invention to provide a novel filling apparatus for use in inserting into containers products such as foaming type liquids or sticky and clinging products.

Another object of the present invention is to provide a novel filling apparatus wherein the filling stream initially enters the containers adjacent the bottom thereof and wherein the point of entry is raised as the filling progresses, but remains beneath the surface of the product already in the container.

These and other objects and advantages of the instant invention will become apparent from the following description and accompanying drawings, in which:

FIG. 1 is an isometric view illustrating a portion of the filling machine incorporating the nozzle of the present invention.

FIG. 2 is an axial section through the rotary filling valve and nozzle illustrated in FIG. 1 with the nozzle shown in its extended position.

FIG. 3 is a view similar to that shown in FIG. 2 with the nozzle shown in its retracted position.

FIG. 4 is a schematic plan view illustrating the manner in which the star wheel is actuated to open and close the rotary valve.

Referring now to the drawings, and particularly to FIG. 1 thereof, the filling machine 10 of the instant invention is of the type disclosed in the patent to Gollmer Number 2,307,214 and in general comprises a power driven rotatable turret 11 mounted on a suitable frame 21 and including a product reservoir or filler bowl 12 about which are mounted a plurality of filler valve assemblies 14 (only one of which is shown) which rotate with the filler bowl, and a plurality of can embracing pockets 16 (FIG. 1) formed in the periphery of said turret. Reference may be had to the above identified patent for a description of a drive mechanism for such a turret. The pockets 16 are adapted to embrace containers 18 and position each container in coaxial alignment with one of the filler valve assemblies 14. A cam support ring 20 is mounted in fixed position on the frame 21 of the machine adjacent the filler valve assemblies 14. A pair of cam rails 22 and 24 are mounted in

vertical spaced relation with each other by a plurality of brackets 26 fixed to the cam ring 20 by brackets 27. The cam rails 22 and 24 are adapted to actuate a plunger cam roller described hereinbelow.

A no can, no fill mechanism 25 (FIG. 1) is mounted adjacent the path of movement of the containers 18 to be filled, and comprises a container actuated arm 28 pivotally mounted on a vertical pivot shaft 30 fixed to the frame of the machine. The arm 28 carries a bracket 32 fixed thereto, which bracket, in turn, is provided at its upper end with a laterally extending pin 34. The pin 34 extends through a slot 36 formed in the end 38 of a bell crank 40 pivotally mounted at its central portion on a pin 42 fixed to a bracket 44 which, in turn, is mounted on the cam ring 20. The other arm 46 of the bell crank 40 is an actuating member adapted to contact one of two diametrically opposed upper arms 48*a* of a star wheel 48 connected to the filling valve in a manner described hereinbelow. The star wheel 48 is also provided with two diametrically opposed lower arms 48*b* 90° removed from the upper arms 48*a*.

Normally, the arm 46 is disposed above the plane of the upper arms 48*a*. If a container 18 is present in the turret pocket 16 which is approaching the filling station, the container will contact the arm 28, rotating the arm outwardly so that the pin 34 causes the bell crank 40 to rotate clockwise, as illustrated in FIG. 1, until the actuating arm 46 thereof is rotated and moved downwardly into the same horizontal plane as the upper arms 48*a* on the star wheel 48. The arm 46 is contacted by one of the arms 48*a* on the star wheel 48 as the valve assembly 14 moves therepast to rotate the star wheel 48 through an angle of 90° to open the filling valve assembly 14. If no container is present, the arm 28 will remain in its inward position under the influence of a torsion type actuating spring 47 and the arm 46 will remain in its uppermost position out of the plane of the fingers on the star wheel 48 and the valve 14 will not be actuated.

Turning now to FIGS. 2 and 3 each valve assembly 14 comprises a housing 50 connected to the outer surface of the filler bowl 12 by a plurality of bolts 52 (FIG. 1). The housing 50 is provided with a port 54 (FIGS. 2 and 3) providing communication between the filler bowl 12 and the interior of the valve housing 50. A second port 56 provides communication between the interior of the valve housing 50 and a measuring chamber 58 one of which is mounted on the turret adjacent each valve assembly. Within each chamber 58 is mounted a cam actuated piston 60 the purpose of which will be described hereinbelow.

A rotary valve element 62 is mounted within the valve housing 50 for rotation with respect thereto and is retained therein by a suitable clamp 64 fixed to the bottom of the valve housing 50 by suitable cap screws 66. The valve element 62 is provided with a central bore 68. A pair of diametrically opposed ports 70 and 72 (FIG. 2) in the valve element 62 provide communication between the exterior of the valve element 62 and the central bore 68 therethrough. The two ports 70 and 72 are at the same elevation as an end portion of the port 56 through the valve housing 50 and are adapted to register therewith to provide communication between the chamber 58 and the bore 68 through the valve element 62. A pair of vertically extending grooves 74 and 76 (FIG. 3) are formed in the outer surface of the valve element 62 at diametrically opposed positions, 90° removed from the ports 70 and 72. The grooves 74 and 76 are adapted to register with and provide communication between the ports 54 and 56 in the valve housing 50.

A filling tube or nozzle 80 is slidably mounted in an upwardly extending tubular extension 82 formed in-

tegrally with the valve housing 50. The nozzle 80 is also slidably mounted in the bore 68 of the valve element 62 and is provided on its inner portion with a vertically extending slot 84 adapted to register with one or the other of the ports 70 and 72, respectively, when said ports are in registry with the port 56 in the valve housing 50. The upper end of the filling nozzle 80 is closed by a plug 86 fixed thereto. The plug 86 carries a laterally extending pin 88 (FIG. 1) which is slidably received in a vertical slot 90 formed in the valve housing extension 82. A cam roller 92 is rotatably mounted on the pin 88 and is received between the vertically spaced guide rails 22 and 24 previously described.

In the operation of the filling mechanism of the present invention, the elements of the filling valve assembly 14 are initially in the positions illustrated in FIG. 3. The filling nozzle 80 is in its upper position and the valve element 62 is in a position wherein one of the grooves 74 or 76 is in register with the ports 54 and 56 in the valve housing 50. The material to be filled now can flow from the filler bowl 12 through the port 54, the groove 74 or 76 and the port 56 into the measuring chamber 58, the piston 60 therein being in its lowermost position determined by a suitable cam (not shown). As the turret rotates, the cam rails 22 and 24 move the filling nozzle 80 downwardly within a container 18 until the lower end of the plunger is adjacent the bottom of the container. The no can, no fill mechanism will have been actuated by the container 18 as the filling nozzle is being lowered so that the arm 46 is at the same elevation as the arms 48*a* on the star wheel 48, which is fastened by any suitable means such as set screw 49 (FIG. 2) to the valve element 62. As the valve assembly 14 passes the arm 46, the star wheel and the valve element 62 attached thereto will be rotated by the arm 46 through an angle of 90° to bring either the port 70, or the port 72, into register with the port 56 in the housing 50, and with the vertical slot 84 in the filling nozzle 80. The actuating cam (not shown) now raises the piston 60 to force the measured amount of material in the chamber 58 outwardly through the port 56, the port 70 or 72 which ever is in register therewith, and the slot 84 into the hollow filling nozzle 80, and out of the lower end of the nozzle 80 into the container 18. As the container is filled, the cam rails 22 and 24 raise the filling nozzle 80 so that the lower end thereof is just beneath the surface of the product in the container 18 at all times during the filling.

When the desired amount of product has been introduced into the container 18, the star wheel 48 approaches a cam finger 100 (FIG. 4), fixed to the machine frame, which contacts one of the lower arms 48*b* on the star wheel 48 and rotates the valve element 62 through an angle of 90° to remove the port 70 or 72 from register with the port 56 to cut-off the flow of products to the filling nozzle 80, and to also bring either the groove 74 or 76 into register with the ports 54 and 56. It will be noted that if the valve element 62 had not been actuated by the arm 46 the fixed cam finger 100 will clear the upper arms 48*a* on the star wheel 48 and will not actuate the valve. When the filling nozzle 80 approaches its uppermost position defined by the configuration of the cam rails 22 and 24, the slot 84 registers with a vent port 96 permitting atmospheric pressure to enter the upper end of the nozzle 80 so that the liquid contained therein will drain from the nozzle into the container 18. If a sticky or clinging product is being filled by use of the machine of the present invention, the vent port 96 would be plugged and the nozzle 80 would remain filled with the product which would then be expelled therefrom on the next filling cycle of the machine.

A typical cam mechanism for actuating the piston 60 is disclosed in the above-mentioned patent to Gollmer Number 2,307,214.

From the foregoing description it may be seen that there has been provided a novel filling mechanism which is adapted to handle both foaming type liquids and sticky or clinging products with a minimum of entrained air which causes foaming of the liquid, and with a minimum of voids in a container filled with a sticky or clinging product.

While a preferred embodiment of the present invention has been shown and described herein, it should be noted that various changes may be made therein without departing from the spirit of the invention as defined in the appended claims.

Having thus described my invention what I claim and desire to secure by Letters Patent is:

1. A container filling apparatus comprising a housing having a port therein, a sleeve mounted for rotation within said housing and having a port adapted to be aligned with the port in said housing, a vertically movable filling nozzle slidably mounted in said housing in sliding engagement therewith and having a vertical slot adapted to communicate with the port in said housing, cam means for raising and lowering said nozzle relative to said housing to move the slot in said nozzle toward or away from a position of communication with said port, said slot being elongated in the direction of movement of said nozzle whereby said slot will maintain communication with said aligned ports for a predetermined interval as said nozzle is raised upwardly in said housing, and means for rotating said sleeve to stop flow through said aligned ports and said slot during upward movement of said nozzle.

2. A container filling apparatus comprising a housing having a port therein, a valve sleeve rotatably mounted within said housing and having a port adapted to register with the port in said housing, means for actuating said valve sleeve, a vertically movable filling nozzle slidably mounted in said housing and extending through said sleeve in sliding engagement therewith and having a vertical slot adapted to register with the port in said sleeve, and cam means for raising and lowering said nozzle relative to said housing and said sleeve to move the slot in said nozzle into registry with the port in said sleeve and the port in said housing to establish flow communication and to project the lower end of said nozzle into said container and gradually raise said nozzle as said container fills.

3. A container filling apparatus comprising a housing having a port, a valve sleeve rotatably mounted within said housing, said sleeve having a pair of diametrically opposed ports adapted to register with the port in said housing, means for actuating said valve sleeve, a vertically movable filling nozzle slidably mounted in said housing and extending through said sleeve in sliding engagement therewith, means defining a vertical slot in said filling nozzle adapted to register with the ports in said sleeve, and cam means for raising and lowering said nozzle relative to said housing and said sleeve to move the slot in said nozzle into registry with the port in said housing and the port in said sleeve to establish flow communication and to project the lower end of said nozzle into said container and gradually raise said nozzle to keep the lower end thereof just beneath the level of the liquid in said container as said container fills.

4. A container filling apparatus comprising a housing having two vertically spaced ports, a valve sleeve rotatably mounted within said housing and having a pair of diametrically opposed ports adapted to register with the lowermost port in said housing, means providing a pair of diametrically opposed vertical grooves in the outer surface of said valve sleeve 90° removed from the ports therein, said grooves being adapted to register with and provide communication between the vertically spaced ports in said housing, means for actuating said valve sleeve to bring either one of said ports or one of said grooves into register with the ports in said housing, a vertically movable filling nozzle slidably mounted in said housing and extending through said sleeve in sliding engagement therewith, means providing a vertical slot in

said nozzle adapted to register with the ports in said sleeve, and cam means for raising and lowering said nozzle relative to said housing and sleeve to project the lower end of said nozzle into said container and gradually raise said nozzle as said container fills.

5. A container filling apparatus comprising a housing having a port, a valve sleeve rotatably mounted within said housing and having a port in said sleeve adapted to register with the port in said housing, means for actuating said valve sleeve, a vertically movable filling nozzle slidably mounted in said housing and extending through said sleeve in sliding engagement therewith, means providing a vertical slot in said nozzle adapted to register with the port in said sleeve, cam means for raising and lowering said nozzle relative to said housing and sleeve to project the lower end of said nozzle into said container and gradually raise said nozzle to keep the lower end thereof just beneath the level of the liquid in said container as said container fills, and a vent passage in said housing adapted to register with the slot in said nozzle when said slot is above the port in said sleeve to permit said nozzle to drain.

6. A container filling apparatus comprising a housing have two vertically spaced ports in said housing, a valve sleeve rotatably mounted within said housing and having a pair of diametrically opposed ports in said sleeve adapted to register with the lowermost port in said housing, means for actuating said valve sleeve to either move one of the ports therein into register with one of the ports in said housing or to move said ports therein out of register with the ports in said housing, a vertically movable filling nozzle slidably mounted in said housing and extending through said sleeve in sliding engagement therewith, said nozzle having a vertical slot adapted to register with the ports in said sleeve, cam means for raising and lowering said nozzle relative to said housing and sleeve to project the lower end of said nozzle into said container and gradually raise said nozzle to keep the lower end thereof just beneath the level of the liquid in said container as said container fills, and a vent passage in said housing adapted to register with the slot in said nozzle when said slot is above the ports in said sleeve to permit said nozzle to drain.

7. A container filling apparatus comprising a housing having two vertically spaced ports in said housing, a valve sleeve rotatably mounted within said housing and having a pair of diametrically opposed ports in said sleeve adapted to register with the lowermost port in said housing, means defining a pair of diametrically opposed vertical grooves in the outer surface of said valve sleeve 90° removed from the ports therein, said grooves being adapted to register with and provide communication between the vertically spaced ports in said housing, a vertically movable filling nozzle slidably mounted in said housing and extending through said sleeve in sliding engagement therewith, said nozzle having a vertical slot adapted to register with the ports in said sleeve, cam means for raising and lowering said nozzle relative to said housing and sleeve to project the lower end of said nozzle into said container and gradually raise said nozzle to keep the lower end thereof just beneath the level of the liquid in said container as said container fills, means for rotating said sleeve to selectively bring either one of said ports or one of said grooves into register with ports in said housing, and a vent passage in said housing adapted to register with the slot in said nozzle when said slot is above the ports in said sleeve to permit said nozzle to drain.

8. A container filling apparatus comprising a housing having a port therein, a valve sleeve rotatably mounted within said housing and having a port adapted to register with the port in said housing, a vertically movable filling nozzle slidably mounted in said housing and extending through said sleeve in sliding engagement therewith, said nozzle having a vertical slot adapted to register with the port in said sleeve, means for supporting a container below said nozzle, and cam means for projecting said nozzle downwardly within a container on said support and for raising said nozzle as said container is filled so that the lower end of said nozzle remains slightly below the surface of the product already in said container, and means for rotating said sleeve to bring said port therein into or out of register with the port in said housing and the slot in said nozzle.

9. A container filling apparatus comprising a frame, a liquid containing reservoir mounted on said frame for movement relative thereto, a valve housing having a fluid receiving passage with an outlet port, means mounting said housing on said reservoir so that said passage is in liquid-receiving communication with said reservoir, means supporting a container on said reservoir below said housing, a no-can, no-fill mechanism mounted on said frame in the path of movement of said container, a valve sleeve rotatably mounted within said housing and having a pair of diametrically opposed ports adapted to register with the port in said housing, means for rotating said sleeve in 90° steps to bring said ports in said sleeve successively into register with the port in said housing on every second step of rotation, said means including a star wheel fixed to said sleeve, said star wheel having two sets of diametrically opposed arms projecting outwardly from a central hub, said sets of arms being at different elevations, a cam finger associated with one of said sets of arms for opening said valve, said finger being operatively associated with said no-can, no-fill mechanism and being moved thereby out of the plane of its associated one set of arms when no container is present on said container supporting means, and a fixed cam finger mounted on said frame, said fixed cam finger being associated with the other set of arms for rotating said valve to a closed position.

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